What is claimed is:

1. A transgenic non human animal whose genome contains a nucleic acid sequence comprising a truncated Activin Type II receptor gene and a muscle-specific promoter operably linked and integrated into the genome of the animal, wherein the nucleic acid sequence is expressed so as to result in elevated levels of truncated Activin Type II receptor and increased muscle mass in the animal as compared to a corresponding corresponding nontransgenic animal.

2. The transgenic animal of claim 1, wherein the muscle-specific promoter is a myosin light chain promoter/enhancer.

3. The transgenic animal of claim 1, wherein the Activin Type II receptor is RIIA or RIIB.

4. The transgenic animal of claim 3, wherein the truncated Activin RIIB receptor lacks kinase activity.

5. The transgenic animal of claim 1, wherein the truncated Activin RIIB receptor comprises amino acid residues 1-174 of Activin RIIB.

6. A non-human transgenic animal whose genome contains a nucleic acid sequence comprising a myostatin prodomain and a muscle-specific promoter operably linked and integrated into the genome of the animal, wherein the nucleic acid sequence is expressed so as to result in elevated levels of myostatin prodomain and increased muscle mass in the animal as compared to a corresponding corresponding nontransgenic animal.

7. The transgenic animal of claim 6, wherein the myostatin prodomain comprises about amino acid residues 1 to 262 of a promyostatin polypeptide selected from the group consisting of SEQ ID NOS: 2, 4, 6, 8, 10, 12, 14, 16, 18 and 20, or a functional peptide portion of said myostatin prodomain.

8. The transgenic animal of claim 6, wherein the myostatin prodomain comprises an amino acid sequence selected from the group consisting of:

amino acid residues about 20 to 263 as set forth in SEQ ID NO: 4;
amino acid residues about 20 to 262 as set forth in SEQ ID NO: 2;
amino acid residues about 20 to 262 as set forth in SEQ ID NO: 10;
amino acid residues about 20 to 262 as set forth in SEQ ID NO: 12;
amino acid residues about 20 to 262 as set forth in SEQ ID NO: 8;
amino acid residues about 20 to 263 as set forth in SEQ ID NO: 6;
amino acid residues about 20 to 262 as set forth in SEQ ID NO: 18;
amino acid residues about 20 to 262 as set forth in SEQ ID NO: 14;
amino acid residues about 20 to 262 as set forth in SEQ ID NO: 16;
amino acid residues about 20 to 262 as set forth in SEQ ID NO: 20; and
a functional peptide portion thereof.

9. The transgenic animal of claim 6, wherein the myostatin prodomain further comprises a myostatin signal peptide.

10. The transgenic animal of claim 6, wherein the muscle-specific promoter is a myosin light chain promoter/enhancer.

11. A non-human transgenic animal whose genome contains a nucleic acid sequence comprising a follistatin gene and a muscle-specific promoter operably linked and integrated into the genome of the animal, wherein the nucleic acid sequence is expressed so as to result in elevated levels of follistatin and increased muscle mass in the animal as compared to a corresponding corresponding nontransgenic animal.

12. The transgenic animal of claim 11, wherein the muscle-specific promoter is a myosin light chain promoter/enhancer.

13. An expression cassette comprising a DNA segment encoding a truncated Activin RIIB receptor gene operably linked to a muscle-specific control sequence.

14. The expression cassette of claim 13 wherein the muscle-specific promoter is a myosin light chain promoter/enhancer.

15. An expression cassette comprising a DNA segment encoding a myostatin prodomain gene operably linked to a muscle-specific control sequence.

16. The expression cassette of claim 15 wherein the muscle-specific promoter is a myosin light chain promoter/enhancer.

17. An expression cassette comprising a DNA segment encoding a follistatin gene operably linked to a muscle-specific control sequence.

18. The expression cassette of claim 17 wherein the muscle-specific promoter is a myosin light chain promoter/enhancer.

19. A method for tissue-specific expression of follistatin in a transgenic animal, comprising expressing an expression cassette of claim 17 in the cells of a transgenic animal, wherein the expression cassette is integrated into the genome of the animal, wherein the cassette is expressed so as to result in elevated levels of follistatin in the animal, thereby resulting in increased muscle mass in the transgenic animal relative to a corresponding nontransgenic animal.

20. A cell or cell line isolated from the animal of any of claims 1, 6 or 11, wherein said cell expresses truncated Activin Type II receptor, myostatin prodomain, or follistatin, respectively.

21. A method of inhibiting myostatin binding to an Activin type II receptor comprising contacting myostatin with follistatin, thereby inhibiting binding to the receptor.

22. The method of claim 21, wherein inhibiting binding is through the C-terminus of myostatin.

23. The method of claim 21, wherein the Activin receptor is Act RIIA or Act RIIB.

24. A non-human transgenic animal whose genome comprises a DNA construct comprising a DNA segment encoding a follistatin protein operably linked to a promoter heterologous to the endogenous follistatin gene effective for expression in muscle cells, wherein expression of said DNA construct in muscle cells results in an increase in muscle mass of said animal.

25. The non-human animal according to claim 24 wherein said DNA construct has been introduced into an ancestor of said animal.

26. The non-human animal according to claim 24 wherein said DNA construct is introduced to said animal or ancestor of said animal at an embryonic stage.

27. The non-human animal according to claim 24 wherein said follistatin protein is a truncated, mutant or other variant form of follistatin protein as compared to the wild-type.

28. The non-human animal according to claim 24 wherein said DNA construct is in a MDAF2 expression plasmid containing said DNA segment encoding a follistatin protein.

29. The non-human animal according to claim 24, wherein the animal is a mammal.

30. The non-human animal according to claim 29, wherein said mammal is a mouse.

31. The non-human animal according to claim 29 wherein said mammal is a porcine.

32. The non-human animal according to claim 29 wherein said mammal is a bovine.

33. The non-human animal of claim 24, wherein said animal is an avian species.

34. The non-human animal of claim 33, wherein the avian species is a chicken or a turkey.

35. The non-human animal of claim 24, wherein said animal is an aquatic species.

36. The non-human animal of claim 35, wherein the aquatic species is a finfish.

37. The non-human animal of claim 36, wherein the finfish is a salmon, trout, char, ayu, carp, crucian carp, goldfish, roach, whitebait, eel, conger eel, sardine, zebrafish, flying fish, sea bass, sea bream, parrot bass, snapper, mackerel, horse mackerel, tuna, bonito, yellowtail, rockfish, fluke, sole, flounder, blowfish, or filefish.

38. The non-human animal of claim 35, wherein the aquatic species is a clam, cockle, mussel, periwinkle, scallop, conch, snail, sea cucumber, ark shell, oyster, turban shell, abalone, lobster, prawn; shrimp, crab, squilla, krill, langostino, crayfish/crawfish, Annelida, alligator, turtle, frog or sea urchins.

39. The non-human animal of claim 24 wherein the animal is an ovine.

40. A method of producing a chimeric non-human animal, the method comprising:

obtaining an ovum from animal ovaries;

maturing the ovum in vitro;

fertilizing the mature ovum in vitro to form a zygote;

introducing into the zygote in vitro a nucleic acid construct comprising in operable association a DNA sequence encoding a truncated Activin Type II receptor, a myostatin propeptide, or follistatin, and a regulatory sequence that promotes expression of the DNA sequence encoding the polypeptide;

maturing the zygote to a preimplantation stage embryo in vitro; and

transplanting the embryo into a recipient female animal, wherein the female animal gestates the embryo to produce a chimeric animal.

41. A method of producing animal food products having increased muscle mass comprising:

a) introducing a transgene encoding follistatin, myostatin propeptide or a truncated Activin Type II receptor into germ cells of a pronuclear embryo of the animal;

b) implanting the embryo into the oviduct of a pseudopregnant female thereby allowing the embryo to mature to full term progeny;

c) testing the progeny for presence of the transgene to identify transgene-positive progeny;

d) cross-breeding transgene-positive progeny to obtain further transgene-positive progeny; and

e) processing the progeny to obtain foodstuff.

42. A method of producing avian, porcine, piscine or bovine food products having increased muscle mass comprising:

a) introducing a transgene encoding follistatin, myostatin propeptide or a truncated Activin Type II receptor into an embryo of an avian, porcine, piscine or bovine animal;

b) culturing the embryo under conditions whereby progeny are hatched;

c) testing the progeny for presence of the transgene to identify transgene-positive progeny;

d) cross-breeding transgene-positive progeny; and

e) processing the progeny to obtain foodstuff.